

Prevalence, Patterns, and Predictors of Paranormal Beliefs in the Netherlands: A Several-Analysts Approach

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Abstract

Paranormal beliefs encompass a wide variety of phenomena, including the existence of supernatural entities such as ghosts and witches, as well as extraordinary human abilities such as telepathy and clairvoyance. Little is known, however, about the prevalence and pattern of paranormal beliefs in a highly secular country such as the Netherlands. In the current study, we used a nationally representative sample ($N = 2534$) to investigate the presence and correlates of paranormal beliefs among the Dutch. The results indicated that most single paranormal phenomena (e.g., belief in clairvoyance) are endorsed by 10-20% of Dutch respondents; however, 55.6% of respondents qualify as ‘paranormal believers’ based on the preregistered criterion that they believe in at least one phenomenon with considerable certainty. In addition, we invited four analysis teams with different methodological expertise to assess the structure of paranormal beliefs using traditional factor analysis, network analysis, Bayesian network analysis, and latent class analysis. The teams’ analyses indicated adequate fit of a four-factor structure reported in a 1985 study, but also emphasized different conclusions and insights across techniques; network analyses showed evidence against strong connectedness within most clusters, and suggested a five-cluster structure. The application of various analytic techniques painted a nuanced picture of paranormal beliefs and believers in the Netherlands and suggests that despite increased secularisation, subgroups of the general population still believe in paranormal phenomena.

Keywords: Paranormal beliefs, Conspiracy beliefs, Team science, Many analysts

I assume that the reader is familiar with the idea of extra-sensory perception, and the meaning of the four items of it, viz. telepathy, clairvoyance, precognition and psychokinesis. These disturbing phenomena seem to deny all our usual scientific ideas. How we should like to discredit them! Unfortunately the statistical evidence, at least for telepathy, is overwhelming.

Alan Turing, 1950


As highlighted in the epigraph, the founding father of computer science and artificial intelligence firmly believed in the reality of extra-sensory perception (ESP; Oppy & Dowe, 2016). In fact, the human ability for ESP constituted one of Alan Turing’s main arguments against the notion that machines can truly “think”. Turing’s conviction was strengthened, the story goes, by the card-guessing experiments of J. B. Rhine, which he regarded as providing “statistically overwhelming evidence”.¹ And Turing is not the sole famous scientist who was convinced of the existence of the paranormal. Sir Isaac Newton, the founding father of modern physics, was a devoted alchemist who experimented endlessly to discover the recipe for the mythical Philosopher’s Stone (Bosveld, 2010); physicist Pierre Curie, husband of Nobel laureate Marie Curie, regularly attended séances of the (in)famous medium Eusapia Palladino (Voss, 2014), and philosopher Arthur Schopenhauer argued that we cannot deny the evidence for predictive dreams and clairvoyance “now that countless testimonies, from the most credible circles, have confirmed such predictions of the future.” (Schopenhauer, 1841, 2009).

More recently, the continued popularity of gurus, shamans, faith healers, and spiritual retreats (e.g., meditation or psychedelic retreats) reflects a continued and widespread interest in supernatural phenomena. This year several articles appeared in reputable newspapers about the hype surrounding ‘manifestation’: the ability to create your own reality by wanting, feeling, and saying.² According to a 2018 national survey among 1,207 US respondents, approximately 75% of the American public believe in at least one of several paranormal phenomena such as psychic powers, haunted places, psychokinesis, and alien visits (Chapman University Survey, 2018, for a review of previous surveys, see below).

In the current study, we investigated the prevalence of paranormal beliefs among

¹For a discussion on psychic experiments from the perspective of statistical evidence, see Wagenmakers et al. (2015).

²Or in the case of well-known YouTube gurus, “Moneyfestation” (tagline: *never want to worry about money again? Then start moneyfesting today!* Course fee: €199).

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Part of the content of the current article is based on a report of the study that appeared in the Dutch magazine *Skepter*.

the Dutch population, using a representative sample of 2,511 Dutch citizens. Respondents were presented with statements about 28 concrete paranormal phenomena, ranging from contact with aliens and spirits, to telepathy, reincarnation, and lucky numbers. The study is in part a replication of the opinion survey entitled ‘secret forces’ conducted in 1985 by the Dutch Foundation for Statistics, complemented with items based on a recently developed paranormal belief scale (Dean et al., 2021). The aims of the current paper are threefold. First, we will outline the extent and pattern of paranormal belief in the Netherlands. Second, we will evaluate predictors and correlates of paranormal beliefs based on the 1985 results and current literature, such as religious identify and conspiracy beliefs. Third, we will assess the replicability of the factor structure of paranormal beliefs reported in 1985. To achieve the last aim, we invited five independent teams of analysts with expertise in relevant methodology to provide their independent judgment. This so-called ‘several-analysts’ effort attempts to gauge the robustness of the conclusions across participating teams, thereby preventing the model myopia that accompanies the traditional publication model in which a single team conducts all of the analyses (e.g., Silberzahn & Uhlmann, 2015; Wagenmakers et al., 2021, 2022). The present study is preregistered on the Open Science Framework (<https://osf.io/jx758>), where the questionnaire, the criteria used to identify ‘paranormal believers’ and ‘skeptics’, the planned analyses for the predictor evaluation, as well as the instructions to the analysis teams were defined before the start of data collection.

First of all, it should be noted that the exact definition and demarcation of paranormal beliefs is far from unequivocal (Lindeman & Svedholm, 2012). Paranormal beliefs are generally used as an umbrella term for a range of New Age beliefs, including belief in precognition, Psi, spiritualism, telepathy, psychokinesis, channelling, witchcraft, and superstition. Some paranormal phenomena overlap with religious traditions, such as healing by the laying on of hands or reincarnation, while others are more related to everyday superstitions such as the alleged risk of walking under a ladder or the existence of lucky numbers. In the present paper we adhere to the following working definition: *paranormal beliefs are characterized by a violation of scientifically established natural laws of physics, biology, and psychology* (Lindeman & Aarnio, 2006), *and are endorsed by people “who might normally be expected by their society to be capable of rational thought and reality testing”* (Irwin, 2009, pp. 16-17). In the narrow sense of the term, this definition excludes idiosyncratic false beliefs, including those attributed to mental disorders such as schizophrenia (i.e., delusions) because those are regarded as symptomatic of abnormal cognitive functioning (Miyazono, 2015). Conspiracy beliefs and belief in pseudoscience such as homeopathy also fall outside of the current definition, as they do not violate natural laws in any way.³

³Irrespective of the evidence, homeopathy assumes that some physical substance can have a physical effect, which is in line with natural laws. Mental healing practices instead assume that the mental power of one individual can have a physical effect on another individual, which does conflict with natural laws as we

Paranormal beliefs have been a topic of interest in the scientific literature. Specifically, many studies have investigated correlates of paranormal beliefs in the domain of cognitive functioning and personality characteristics. For instance, a wide variety of cognitive biases and reasoning errors have been associated with an increased tendency to believe in paranormal phenomena, ranging from agency detection biases (Krummenacher et al., 2010; Riekkari et al., 2013; van Elk, 2013), the illusion of control (Blackmore & Troscianko, 1985; Blanco et al., 2015; Brugger et al., 1991; Irwin, 2009) and the self-attribution bias (van Elk, 2017), to ontological confusions (Lindeman et al., 2008, 2015; Lindeman & Aarnio, 2006; Lindeman & Svedholm-Häkkinen, 2016; Svedholm et al., 2010), illusory pattern perception (Bressan, 2002; Dagnall et al., 2007, 2016; Riekkari et al., 2014), and jumping to conclusions (Blanco et al., 2015; Brugger & Graves, 1997; Irwin et al., 2014). Relatedly, a tendency to apply less stringent criteria for ‘evidence’ has been related to an increased likelihood to endorse paranormal beliefs; paranormal believers may be more likely to endorse many different statements, especially in the face of ambiguous information. In this regard, increased belief in paranormal phenomena has been correlated with susceptibility to suggestion (Hergovich, 2003), gullibility (Preece & Baxter, 2000; Standing & Keays, 1987), and intuitive thinking as the overall dominant thinking style (Aarnio & Lindeman, 2005; Gervais & Norenzayan, 2012; Gray & Gallo, 2016; Lindeman & Aarnio, 2007; Lindeman & Svedholm-Häkkinen, 2016; Pennycook et al., 2012, 2013; Ross et al., 2017; Sadler-Smith, 2011; Svedholm & Lindeman, 2013).

At the same time, relatively little is known about the prevalence of paranormal beliefs among the general public, as few studies with representative samples have been conducted. To the best of our knowledge, the few polls with representative samples mostly originate from the US, a country with relatively high levels of religiosity and supernatural beliefs. For instance, in a 2005 survey, 37% of US respondents reported belief in the existence of cursed places (“haunted houses”), 31% in telepathy, and 20% in reincarnation (Moore, 2005).⁴ In 2018, these rates were even slightly higher; 58% of US respondents believed in places haunted by spirits, 26% in telekinesis (i.e., moving objects with mental force), 21% in the existence of Bigfoot, and 17% in clairvoyance (i.e., predicting the future; Chapman University Survey, 2018). A 2023 Ipsos survey showed similar rates; 39% of US respondents believed in ghosts, 42% in aliens who visited earth as well as 34% in extrasensory perception and 22% in spells or witchcraft (Ipsos, 2023). Overall, in both 2005 and 2018 about 75% of US respondents were classified as paranormal believers, based on the criterion that they endorsed at least one of the inquired paranormal phenomena (Chapman University Survey, 2018; Moore, 2005).

currently understand them.

⁴Only ‘channeling’—allowing a ‘spiritual being’ to temporarily take control of the body—was endorsed by “only” 9%.

Some further information is available about paranormal beliefs in the UK and Canada; according to a 2017 poll, 33% of the British believe in ghosts, ghouls, spirits or other types of paranormal activity, while 21% are unsure (McGlone, 2017). A Gallup poll from 2005 showed comparable levels of paranormal belief in the US, Canada, and the UK, with the most popular phenomenon in all three countries that of haunted houses. Additionally, Americans were somewhat more likely to believe in the existence of witches (21% vs 13% in Canada and the UK), whereas Britons were most convinced of the possibility to communicate with deceased (27% vs 21% in the US and 24% in Canada; Lyons, 2005).

How these rates compare to those in the non-English speaking world remains relatively unclear. A 1985 survey from the Netherlands –one of the world’s most secular countries– indicated more skepticism compared to current rates in the US; about 40 years ago, 7% of the Dutch population believed in spirits and ghosts, 4% in contact with aliens, 15% in telekinesis, 11% in reincarnation (but also 32% in telepathy and 31% in clairvoyance, similar to or exceeding the US numbers; see Table A1 in the Appendix for a comparison of the 1985 and 2023 rates). It is unknown however, how these rates have developed over the last 40 years. On the one hand, Dutch society has continued its path towards secularization, partly explained by an increasing focus on (scientific) education and higher social security (Kregting et al., 2018). This would suggest that the rate of supernatural beliefs, including paranormal beliefs, will have decreased since 1985. On the other hand, there are abundant media reports about the rise of a new form of spirituality, with elements of supernatural and conspiracy beliefs (Donner, 2023; Rusman, 2021; van Iperen, 2022; Weijts, 2023). This modern movement has been referred to by scholars as *conspirituality* (Asprem & Dyrendal, 2015; Gligorić et al., 2021; Parmigiani, 2021; Ward & Voas, 2011), in which belief in positive elements such as the power of love, connection, and intuition go hand in hand with belief in negative external influences such as conspiracies about covid-vaccinations and underground pedophilia rings (e.g., Pizzagate). According to reports by the Netherlands Institute for Social Research, the New Age movement indeed reached its peak of popularity in the 1980s (de Hart, 2013, 2014). In these reports it is speculated, however, that later on, New Age beliefs were increasingly replaced by terms such as ‘new’, ‘holistic’, or ‘alternative’ spirituality, with a focus on intuition and individual feelings as the criterion for the truth. Although paranormal phenomena appear to have become more familiar among the general public throughout the last decades, it is unclear to what extent the Dutch actually believe in, let alone actively engaged with paranormal phenomena (de Hart, 2013).

In addition to investigating the prevalence of paranormal beliefs in the Netherlands, we also sought to identify demographic predictors and general correlates of these beliefs. Based on the 1985 report and recent literature, we preregistered the following hypotheses regarding demographic predictors of paranormal beliefs:

1. Women report more paranormal beliefs than men (e.g., Aarnio & Lindeman, 2005; Lindeman et al., 2015; Vyse, 2014);
2. People who identify as spiritual-but-not-religious (SbnR) report more paranormal beliefs than the other groups (spiritual-and-religious, religious-but-not-spiritual, not-religious-and-not-spiritual; e.g., Lindeman & Aarnio, 2006; Saucier & Skrzypińska, 2006; Willard & Norenzayan, 2017);

In addition to these demographic characteristics, we also investigated two additional correlates of paranormal beliefs. First, research on religion has repeatedly shown that the strongest predictor of religiosity is exposure to credibility enhancing displays (CREDEs): behavioral cues indicative of underlying beliefs, mainly from one's parents and direct social network, such as engaging in prayer, attending religious services, wearing specific clothing, etc. (Gervais et al., 2021; Henrich, 2009; Lanman & Buhrmester, 2017; Maij et al., 2017). In the current study, we adjusted existing CREDEs items to capture parental acts related to belief in paranormal phenomena, such as attending paranormal fairs, engaging in paranormal activities (e.g., palm reading, seances), and speaking about paranormal encounters. This results in the third hypothesis:

3. Exposure to parental displays of belief in paranormal phenomena is positively associated with paranormal beliefs;

Additionally, both paranormal and conspiracy beliefs share the characteristic of being empirically unsubstantiated, yet concerning different domains (i.e., supernatural reality versus secret human activities). As illustrated by the phenomenon of conspiratoriality and supported by empirical research, paranormal beliefs are assumed to be positively related to conspiracy beliefs (Darwin et al., 2011; Lobato et al., 2014; van Elk, 2015; van Prooijen et al., 2022). This leads to the fourth hypothesis:

4. Conspiracy beliefs are positively associated with paranormal beliefs.

In an exploratory analysis, we gauged the extent to which age, level of education, and geographic location (large cities vs. rest of the country) predict paranormal beliefs. Since the results of the 1985 Dutch survey contradict recent published findings in the literature, we did not preregister predictions for these variables.

Several-Analysts Approach

The final aim of this project was to investigate the (factor) structure of paranormal beliefs using different analytic techniques in a many-analysts fashion. A many-analysts approach involves different analysis teams that each attempt to address a particular research

question using the same data but different statistical methods. This approach has been used to empirically assess analytic variability / robustness of research outcomes (Bastiaansen et al., 2020; Boehm et al., 2018; Botvinik-Nezer et al., 2020; Dutilh et al., 2019; Hoogeveen, Sarafoglou, Aczel, et al., 2023; Salganik et al., 2020; Schweinsberg et al., 2021; Silberzahn et al., 2018; Starns et al., 2019; van Dongen et al., 2019; Wagenmakers et al., 2022). In the current project, we directly invited experts from research groups that have relevant knowledge concerning our statistical question and design (i.e., scale assessment). In particular, we recruited analysis teams specialized in latent variable modeling (i.e., confirmatory factor analysis), frequentist network analysis, Bayesian network analysis, and latent class modeling. These techniques all allow us to draw conclusions about the structure of paranormal beliefs, but also provide unique contributions and insights.

This more targeted form of a many-analysts approach we term a *several-analysts* approach (cf. van Dongen et al., 2019). Note that this approach differs from typical multi-analysts projects, since the explicit aim is to compare the outcomes from different methods, instead of quantifying variability naturally arising from executing different plausible analysis plans. In other words, rather than inviting as many analysts as possible and evaluating the differences in outcomes resulting from differences in analytic decisions made by the teams themselves, we intentionally invited teams with different methodological backgrounds and asked them to apply their specialty analysis to the data. The outcomes of our several-analysts approach should thus not be regarded as a natural consequence of different principled decisions. At the same time, the potential (lack of) variation in conclusions across analysis teams can be interpreted in terms of robustness; if all analytic techniques yield the same conclusions regarding the structure of paranormal beliefs, this increases our confidence about this structure, whereas vastly different conclusions will undercut this confidence.

The four participating teams were presented with two primary questions. First, *does the current dataset provide support for the four-factor structure identified in the 1985 study?* These factors were ‘extraordinary human abilities’, ‘supernatural reality’, ‘unearthly beings’, and ‘everyday superstition’ and the exact item loadings per factor are shown in Table 1. Second, *what is the most important conclusion/finding based on these data and the application of the team’s statistical technique?* The teams’ answers to these questions are presented in the Results section. A more extensive by-team analysis can be found in the online supplements <https://osf.io/645tz/>.

Disclosures

Data, Materials, and Preregistration

The current study was preregistered on the Open Science Framework; readers can access the preregistration, as well as all materials for the study, the anonymized raw and

Table 1

Factor analysis results regarding paranormal beliefs in the Netherlands measured in 1985 (N = 813)

Item	Description	Dimension			
		I	II	III	IV
Dimension I: extraordinary human abilities					
5	Healing by laying on of hands	++			
8	Life course description by possessions	++			
11	Graphology (characterization by handwriting)	++			
13	Dowsing (locating ground water using a rod)	++			
9	Telepathy (mind-reading)	++			
15	Causing events by wanting ('manifestation')	++	+	+	
7	Clairvoyance (seeing into the future)	++	+		
10	Seeing events happening (while absent)	++	+		
Dimension II: supernatural reality					
1	Predictive dreams		++		
2	Contact with deceased		++	+	
6	Palmistry (palm reading)	+	++	+	
3	Astrology	+	++	+	
17	Reincarnation		++	+	
23	Recounting from a previous life		++	+	
14	Telekinesis (moving objects with mental force)*	?	?	?	?
Dimension III: unearthly beings					
4	Spirits and ghosts		++	++	
16	Gnomes and elves		+	++	
12	Contact extraterrestrial beings (aliens)			++	
24	Devil possession			++	
18	Sorcery, black magic	+		++	
19	Haunted places		+	++	
Dimension IV: everyday superstition					
22	Misfortune from walking under a ladder			+	++
20	Lucky numbers				++
21	Unlucky numbers				++

Note. '++' indicates factor loadings >.50 and '+' indicates factor loadings between .40 and .49.

*Item 14 on telekinesis was mentioned under dimension II but omitted from the factor loading table in the original document.

processed data (including relevant documentation), and the R code to conduct all analyses (including all figures), on the OSF <https://osf.io/645tz/>. Any deviations from the preregistration are highlighted in this manuscript. In particular, we preregistered inviting five teams of analysts. However, the expert on Bayesian factor analysis was unable to participate in the end. We therefore report the results of the four remaining analytic techniques.

Reporting

We report how we determined our sample size, all data exclusions, and all manipulations in the study.

Ethical Approval

The study was approved by the local ethics committee at the Psychology Department of the University of Amsterdam (registration number: FMG-3114). All participants were treated in accordance with the Declaration of Helsinki.

Methods

Participants

Data were collected on behalf of Stichting Skepsis (<https://skepsis.nl/>), a Dutch foundation dedicated to the promotion and practice of scientific skepticism, in collaboration with Kieskompas, an independent research agency specialized in polls for elections and scientific research. Participants were invited from the Kieskompas VIP-panel, a stratified sample based on gender, age, level of education, migration-background, Nielsen-district⁵, and voting behavior. Subsequently, the data were weighted based on the same characteristics so as to generalize the results to the Dutch adult population (analyses reported below are based on the weighted data). Data were collected between April 23th, 2023 and May 4th, 2023. In total, the sample included data from 2,534 subjects (50.7% male, mean age = 49.91, SD = 18.06).

Sampling Plan

We preregistered a sample size of around 2500, which allows for a 95% confidence interval with a <2% margin of error in the prevalence rates of paranormal belief.

Materials

The study used a cross-sectional design and included a variety of self-report measures. All measures were administered in Dutch.

⁵Nielsen districts are regional classifications for the purpose of market research, dividing the Netherlands into five regions.

Paranormal beliefs. The main measure of interest concerns a paranormal beliefs scale. The questionnaire is primarily based on a 1985 survey conducted by the Dutch Foundation for Statistics (Nederlandse Stichting Statistiek; NSS). Items 1-24 are taken directly from this survey. Items 25-26 are taken (in slightly adapted form) from the scale by Dean et al. (2021) to complement the 1985 survey.⁶ Items 27-28 were added based on personal judgment and discussion; in particular, we added items on the existence of benevolent spirits and protective acts as counterparts to the existence of the evil spirits / haunted places. All items were measured on a 5-point response scale ranging from ‘definitely not’ (1) to ‘definitely’ (5). The order in which the items were presented was randomized. A Bayesian reliability analysis using the `Bayesrel` package (Pfadt & van den Bergh, 2020) indicated good internal consistency of the 28-item paranormal beliefs scale, McDonald $\omega = 0.964$, 95% credible interval [0.962, 0.966].

Conspiracy Beliefs. The five-item Conspiracy Mentality Questionnaire (Bruder et al., 2013) was used to measure generic conspiracy beliefs. All items were measured on a 5-point response scale ranging from ‘definitely not’ (1) to ‘definitely’ (5). The presentation order of the items was randomized. A Bayesian reliability analysis indicated adequate internal consistency of the 5-item conspiracy beliefs scale, McDonald $\omega = 0.880$, 95% CI [0.873, 0.888].

Religious Beliefs. Respondents indicated to what extent they identify with a religious community (0-100 scale); if identification > 0 , respondents additionally specified their religious group (Roman-Catholic, Protestant, Muslim, Hindu, Jewish, Buddhist, or other). Finally, respondents answered a self-categorization item classifying themselves as religious-and-spiritual, religious-but-not-spiritual, spiritual-but-not-religious, or not-religious-not-spiritual.

Parental Paranormal Affinity. Six items on parental affinity with the paranormal were included. Specifically, these items measured the extent to which one has observed parental behavior related to belief in paranormal phenomena. This measure was based on the items used to assess credibility-enhancing displays of religion (Henrich, 2009; Lanman & Buhrmester, 2017; Maij et al., 2017). Here, we targeted parental acts related to paranormal beliefs, such as attending paranormal fairs, engaging in paranormal activities (palm reading, seances), and speaking about paranormal encounters. We created these items ourselves. Three items are measured on a 5-point frequency scale ranging from ‘never’ (1) to ‘often’ (5) and three items are measured on a 5-point degree scale ranging from ‘not at all’ (1) to ‘strongly’ (5). A Bayesian reliability analysis indicated adequate internal consistency of the 6-item paranormal CREDs scale, McDonald $\omega = 0.800$, 95% CI [0.787, 0.812]. Dropping

⁶One additional item from Dean et al. (2021) was included in the preregistration. This item on whether “mentions of a sixth sense are based on fantasy” was excluded upon discussions with the Kieskompas survey experts, as it did not fit the answer options nor the overall question (‘To what extent do you believe in...’).

any of the items did not improve the estimated reliability.

Additional Paranormal Items. For exploratory purposes, we additionally included (1) a single item paranormal experiences to measure the extent to which participants had any personal paranormal experiences (5-pt scale); (2) single item paranormal beliefs to measure the extent of belief in paranormal phenomena (0-100 scale); (3) single item parental paranormal beliefs to measure the extent of belief in paranormal phenomena by parents (0-100 scale); (4) single item paranormal beliefs prevalence estimation: estimate of percentage of the Dutch population that believes in paranormal phenomena.

Quality Check Items. We included four items to identify mischievous survey respondents (Fan et al., 2002; Fish & Russell, 2018; Lopez & Hillygus, 2018; Robinson-Cimpian, 2014). Three items use reports of low-incidence events as a flag for dishonest responding (i.e., implausible height, number of children, and average hours of sleep) and one item directly asks whether participants engage in humorous or insincere responding (5-pt). Participants were flagged as mischievous respondents if they reported implausible answers to at least two of the three low-incidence items or/and report to respond insincerely at least sometimes (i.e., a score of at least 3 on the 5-pt Likert scale). Following Lopez and Hillygus (2018), criteria for the low-incidence items were: (1) sleeping more than 11 hours per day on average; (2) having more than seven children; (3) rare height (i.e., below the gender-specific 0.6th percentile or above the 99.4th percentile). Previous work used a criterion of the bottom or top 2% by gender (Lopez & Hillygus, 2018). We decided to be slightly more conservative and use the ± 2.5 SD criterion (i.e., 0.6% and 99.4%). Based on the Dutch population, this means that for men the cutoff values were $<166\text{cm}$ and $>208\text{cm}$ and for women $<155\text{cm}$ and $>187\text{cm}$ (TNO, 2010). As preregistered, we retained all observations for the primary analyses, but intended to investigate the effect of excluding cases flagged as mischievous respondents (but see below).

Demographics. The following items were included: gender, age, level of education (8 levels), and perceived socio-economic status (10 levels). Nielsen-district was added based on the subjects' province and municipality of residence. These last two pieces of data have been removed from the public dataset in order to safeguard anonymity.

Procedure

Respondents received a link to the Qualtrics survey and filled it out online. After giving informed consent, respondents provided demographics and completed the three low-incidence quality check items and the religiosity items. Then the 28 paranormal beliefs items were completed, followed by the conspiracy beliefs items, the parental affinity items, the additional single-items on paranormal beliefs, and the final quality check item on humorous responding.

Data Analysis

All results reported below (including figures and tables) are based on the weighted data unless indicated otherwise. The confirmatory analyses will be conducted with a Bayesian linear regression model with gender (2 levels), religious-spiritual identification (4 levels), parental affinity score, and conspiracy beliefs score as predictors and paranormal beliefs score (mean of 28 items) as the dependent variable. The exploratory predictors (i.e., age, level of education, and location [large cities vs. rest] were added in the same model. The BAS package (Clyde, 2022) in R was used to conduct the linear regression. The JZS prior was used for the coefficients and a beta-binomial(1,1) prior for the models. Order-constraints were applied to test the predicted direction of the preregistered effects. Finally, to test the prediction that the single-item paranormal beliefs measure is strongly correlated with the overall scale ($r > .7$), we conducted a Bayesian Pearson correlation using the BayesFactor package (Morey & Rouder, 2021).

A short description of the methods used in the several-analysts component is included in the relevant results section. More detailed about the analytic techniques can be found in the online supplements (<https://osf.io/645tz/>).

Results

Descriptive Results

The main dataset consisted of the 28 items of the paranormal beliefs scale. Figure 1 provides a visualisation and summary of results per item of the paranormal beliefs scale (see also Table 2 for the descriptives of the main measures in the study). For the overall scale (i.e., average of the 28 items per subject), we find the following statistics: $N = 2511$, Mean = 1.88 (SD = 0.77), Median = 1.70 (MAD = 0.77), range: [1, 4.71].

In this sample, we identified 55.6% paranormal believers according to the preregistered criterion that they believe in at least 1 of the 28 paranormal phenomenon with some certainty (i.e., a score of ‘4’ or ‘5’ on at least one item). In addition, we identified 18.6% skeptics according to the criterion that they indicated disbelief with some certainty on all 28 paranormal items (i.e., a score of ‘1’ or ‘2’ on all items). Interestingly, when using the continuous overall self-rated paranormal beliefs scale, 30.7% of respondents consider themselves skeptics, as they indicated 0 on the 0-100 scale. However, only 13.3% of respondents qualified as skeptics according to the criterion for the 24-item scale as well as the criterion for the continuous self-report item.

Finally, we asked respondents to estimate the percentage of the Dutch population endorsing paranormal phenomena. This was estimated, on average, at 35.7% – *higher* than the average self-reported belief on the 0-100 scale (i.e., 26.1) but *lower* than the 55.6%

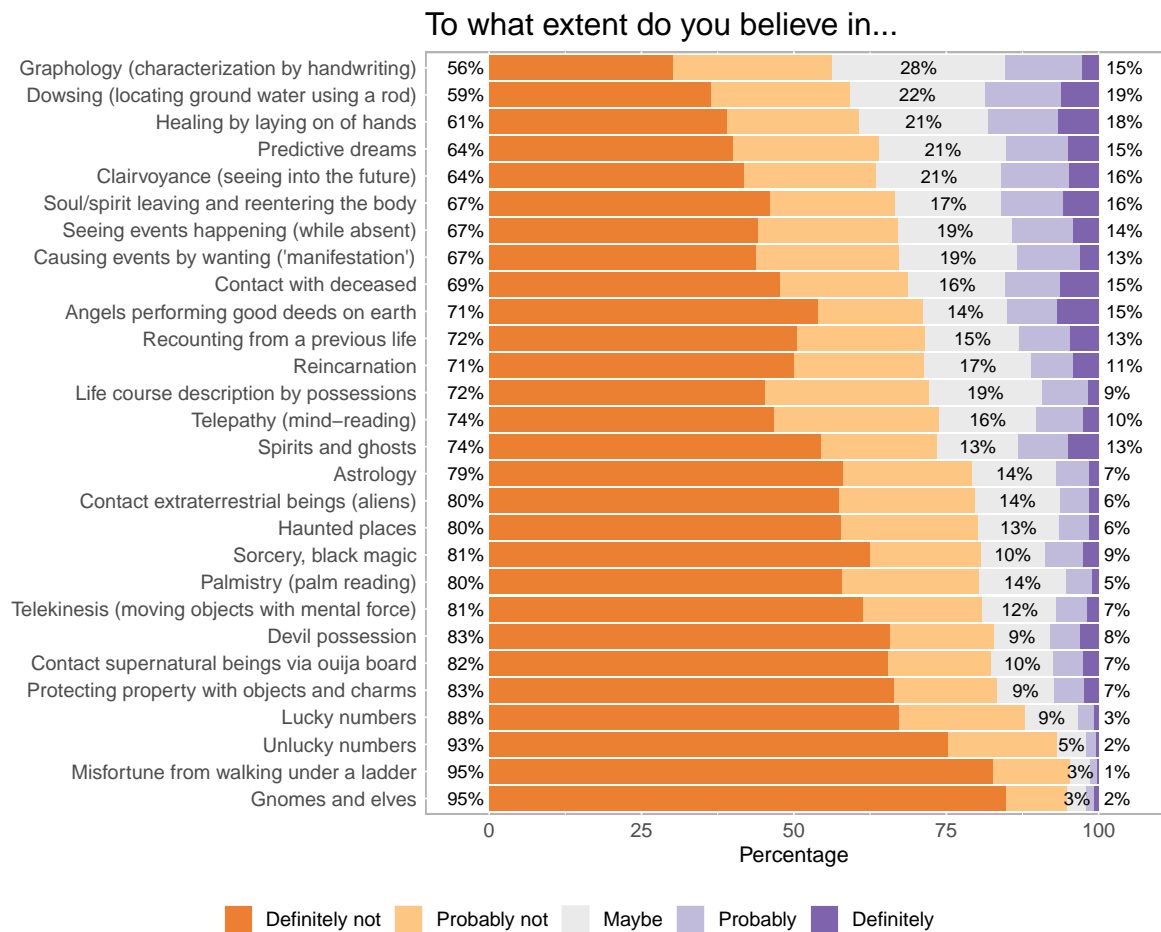


Figure 1

Endorsement of paranormal phenomena. Phenomena are ordered by average belief score (from high to low). The percentages listed reflect the proportion of disbelief, neutrality, and belief for each phenomenon (from left to right).

based on the criterion that one qualifies as a paranormal believer when one believes in at least one paranormal phenomenon with some certainty.

Zooming in on the individual items highlights that the majority of the Dutch population is skeptical about all phenomena. At the same time, most paranormal phenomena were nevertheless considered ‘probably’ true or ‘definitely’ true by 10-20% of the people. As Figure 1 shows, clairvoyance, healing by laying on of hands, the existence of angels and of spirits and ghosts are relatively popular paranormal beliefs. The traditional paranormal act of dowsing is endorsed by 1 in 5 respondents, slightly more than the spiritual trend of manifestation. Daily superstitions such as (un)lucky numbers and the danger of walking under a ladder were considered the least likely. Elves and gnomes induced even more skepticism and dangle at the bottom of the list – as they did back in 1985. A visualisation of

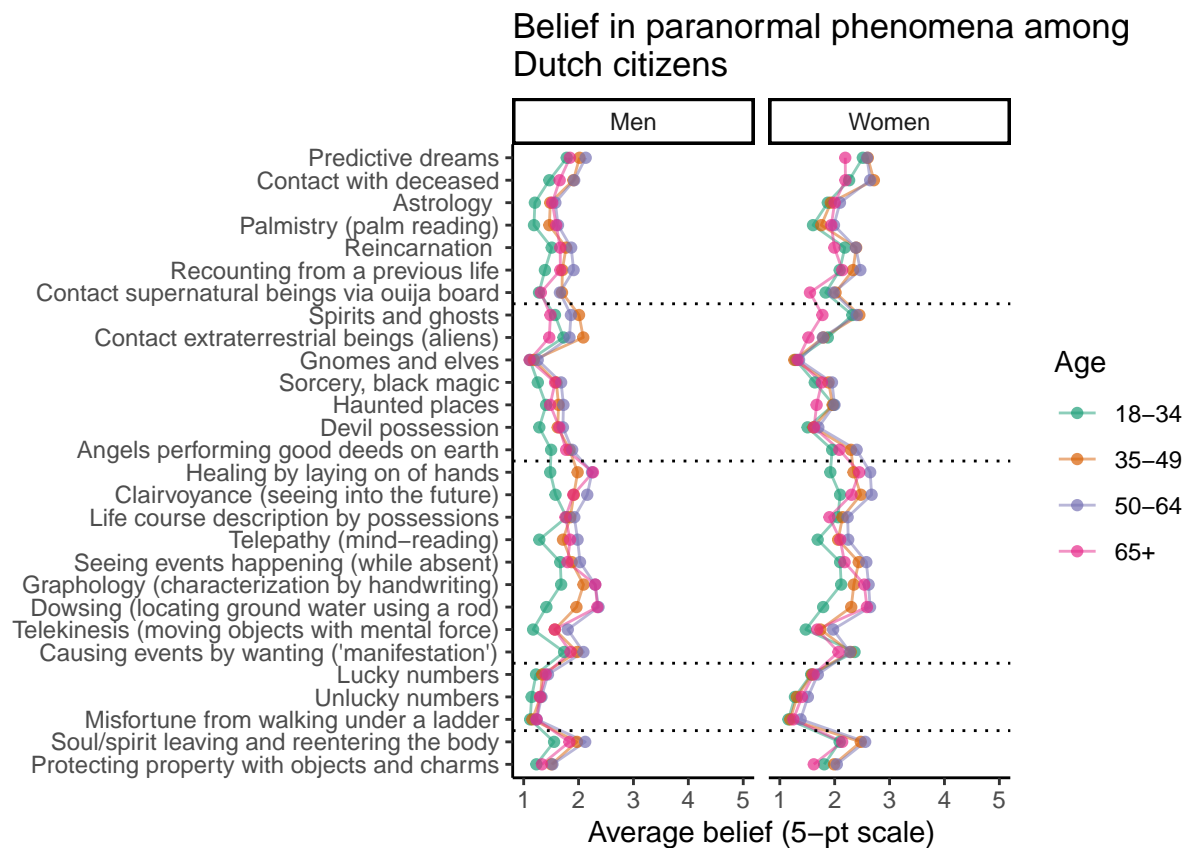


Figure 2

Average belief in paranormal phenomena by gender and age group. The items are grouped by the four categories identified in the 1985 survey. The bottom two items were added to the questionnaire and did not fit the existing categories. Belief was measured on a 5-pt Likert scale ranging from ‘definitely not’ to ‘definitely’.

the average belief score per item split by age group and gender is given in Figure 2.

Conspiracy Beliefs. Figure 3 shows respondents’ answers to the five conspiracy items. It appears that general conspiracy beliefs are more popular than paranormal phenomena.

Mischievous Responders. Our sample contained ‘only’ 2.50% of participants (i.e., 65 respondents) flagged as mischievous responders, whereas previous work reported rates of 21% and 22% for conspiracy beliefs (Lopez & Hillygus, 2018). Moreover, the pattern of responses regarding the endorsement of paranormal beliefs was inconsistent; although for some items we found that participants flagged for mischievous responding were more likely to state that they ‘definitely’ believe in paranormal phenomena, for other items proportions were similar or even lower. This difference in rate and pattern of responses compared to previous work may partly be due to the topic (paranormal beliefs vs. conspiracy beliefs),

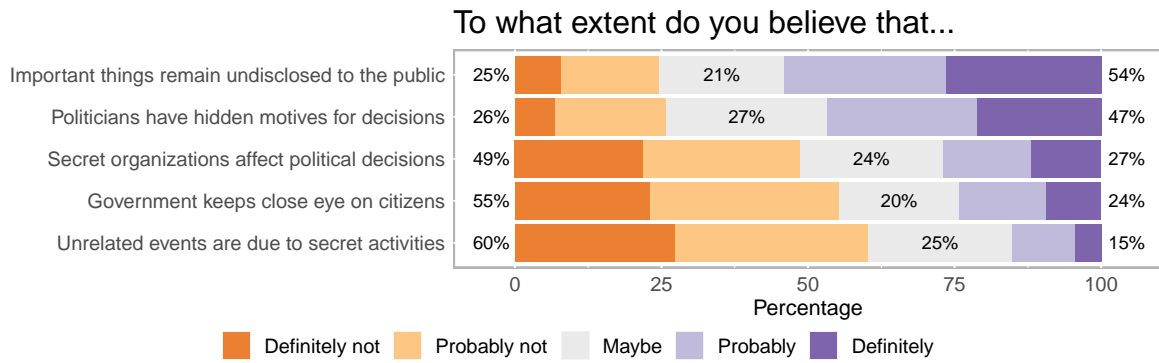


Figure 3

Endorsement of conspiracy beliefs. Statements are ordered by average belief score (from high to low). The percentages listed reflect the proportion of disbelief, neutrality, and belief for each statement (from left to right)

Table 2

Descriptive statistics of the main measures in the study.

	Mean	Median	SD	Min	Max
Paranormal beliefs	1.88	1.70	0.77	1.00	4.71
CREDs paranormality	1.25	1.00	0.44	1.00	4.50
Conspiracy beliefs	2.89	2.80	1.02	1.00	5.00

Note. All items were measured on a 5-point Likert scale. CREDs are credibility enhancing displays.

but we also believe our sample was of relatively high quality, as respondents were part of an existing opt-in panel, participated voluntarily and seemed to have taken the survey seriously. Since the rate of mischievous responders in the current study was low, we did not further analyze the data after removing the ‘trolls’ from the data, but kept all observations as preregistered.

Confirmatory Results

In line with the hypotheses we found that (see also Table 3):

1. Women indeed reported more paranormal beliefs than men ($M_{\text{women}} = 2.01$, $SD_{\text{women}} = 0.83$; $M_{\text{men}} = 1.67$, $SD_{\text{men}} = 0.65$; $BF_{+0} = 10^{18}$).
2. People who self-identified as spiritual-but-not-religious (SbnR) scored higher on paranormal beliefs ($M_{\text{SbnR}} = 2.45$, $SD_{\text{SbnR}} = 0.82$) than those who self-identified as either religious-but-not-spiritual (RbnS; $M_{\text{RbnS}} = 1.77$, $SD_{\text{RbnS}} = 0.65$), $BF_{+0} = 10^{40}$ or as not-religious-and-not-spiritual (nRnS; $M_{\text{nRnS}} = 1.48$, $SD_{\text{nRnS}} = 0.53$), $BF_{+0} =$

10^{106} . However, for the comparison between SbnR and religious-and-spiritual (R&S; $M_{R\&S} = 2.25$, $SD_{R\&S} = 0.81$), the Bayes factor indicated substantial evidence against the hypothesis: $BF_{+0} = 0.064$; $BF_{0+} = 15.710$.

3. Credibility-enhancing displays of paranormal beliefs observed from one's parents were indeed positively associated with paranormal beliefs: $BF_{+0} = 10^{38}$. The model-averaged unstandardized regression coefficient of CREDS on paranormal beliefs is 0.377.
4. Conspiracy beliefs were also positively associated with paranormal beliefs: $BF_{+0} = 10^{60}$. The model-averaged unstandardized regression coefficient of conspiracy beliefs on paranormal beliefs is 0.212.

Additionally, as preregistered, we tested whether the single-item paranormal beliefs measure was strongly correlated with the overall scale ($r > .7$). We indeed found that the single-item paranormal beliefs measure (0-100 continuous scale) was strongly correlated with the overall paranormal beliefs score: $\rho = 0.81$, 95%CI [0.80, 0.83], $BF_{+0} = \infty$.⁷ A scatterplot of the single-item paranormal beliefs measure and scale average is shown in Figure 4.

Exploratory Results

In an exploratory analysis, we examined the extent to which age, level of education, and geographic location (large cities vs. rest) predict paranormal beliefs. Since the results of the 1985 survey contradict recent findings, we did not preregister a prediction for these variables and hence conducted undirected tests.

The data indicated that age was related to paranormal beliefs: $BF_{10} = 56.015$; older people tend to express more belief in paranormal phenomena (on average, paranormal beliefs increase with 0.02 on the 5-point scale with every 10 years). Level of education was not related to paranormal beliefs: $BF_{10} = 0.256$, nor was geographic location specified as living in the large cities versus the rest of the country: $BF_{10} = 0.147$.

Several-Analysts Results

In the following, we provide the results and conclusions that the four different analysis teams provided regarding the (factor) structure of paranormal beliefs and the extent to which the factor structured reported in the 1985 survey could be replicated. In addition, the teams presented their most important insight based on their analysis.

⁷Given the positive skew in both the scale average and the single-item continuous rating, we also conducted a rank-based Spearman correlation test (van Doorn et al., 2020). Again, the data indicated strong evidence for a strong correlation: $\rho_s = 0.80$, 95%CI [0.79, 0.81], $BF_{+0} = 3.5 \times 10^{153}$.

Table 3

Model-averaged posterior summary for regression coefficients of the paranormal beliefs data, using weighted regression.

Coefficient	Mean	SD	$P(\text{incl})$	$P(\text{incl} \text{D})$	BF_{incl}	Lower	Upper
Intercept	1.884	0.012	1.000	1.000	1	1.862	1.907
Woman	0.224	0.024	0.250	1.000	10^{18}	0.177	0.270
R&S	-0.008	0.025	0.250	0.156	0.06	-0.092	0.001
RbnS	-0.535	0.038	0.250	1.000	10^{40}	-0.609	-0.462
nRnS	-0.700	0.028	0.250	1.000	10^{106}	-0.757	-0.646
CREDs	0.377	0.027	0.250	1.000	10^{38}	0.322	0.431
Conspiracy	0.212	0.012	0.250	1.000	10^{60}	0.187	0.235
Age (decades)	0.024	0.007	0.500	0.982	56.01	0.010	0.039
Education	-0.002	0.006	0.500	0.204	0.26	-0.019	0.000
Big Cities	-0.003	0.015	0.500	0.128	0.15	-0.051	0.005

Note. The leftmost column denotes the predictor. The columns ‘mean’ and ‘sd’ represent the respective posterior mean and standard deviation of the parameter after model averaging. $P(\text{incl})$ denotes the prior inclusion probability and $P(\text{incl}|\text{D})$ denotes the posterior inclusion probability. The change from prior to posterior inclusion odds is given by the inclusion Bayes factor (BF_{incl}). The last two columns represent a 95% central credible interval (CI) for the parameters. Order restrictions have been applied to the prior and posterior probabilities and Bayes factors where appropriate.

These analyses are based on the first 24 items from the paranormal beliefs scale. Details on the methods and analyses can be found in the online supplements (<https://osf.io/645tz/>).

1. Traditional Factor Analysis

Author: Dylan Molenaar

Two main models are considered: The first, referred to as ‘Theoretical Model’, is a four dimensional factor model based on the theoretical structure underlying the 1985 analysis by the Dutch Foundation for Statistics. In the 1985 analysis, 16 cross-loadings have been added to the theoretical model (see Table 1), we refer to this model (including the cross-loadings) as the ‘Empirical Model’.

The Empirical Model and the Theoretical Model are fit to the 24 items of the paranormal beliefs scale using diagonally weighted least squares estimation in *Lavaan* (Rosseel, 2012). Model fit is judged by the RMSEA, the CFI, and the TLI using the guidelines by Schermelleh-Engel et al. (2003). That is, for the RMSEA, values above 0.08 are taken as an indication of poor model fit, values between 0.05 and 0.08 are taken as an indication of

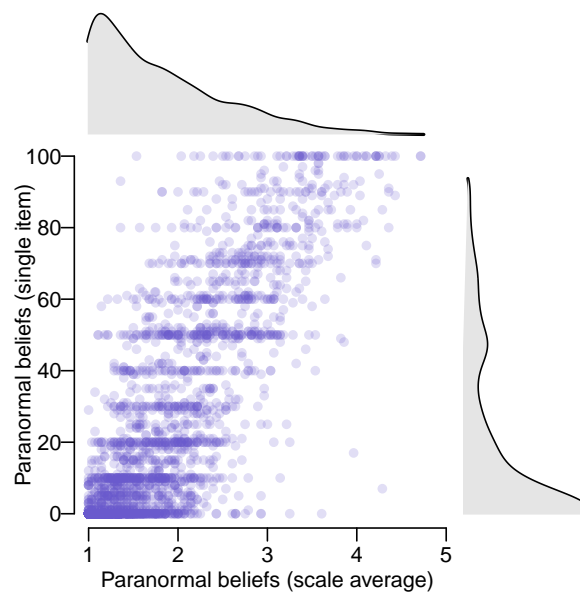


Figure 4

Correlation between the single-item self-reported paranormal beliefs (y-axis) and the average of the 27 paranormal belief items (x-axis), with the marginal density distributions on the sides.

acceptable model fit, and values below 0.05 are taken as an indication of good model fit. For the CFI and TLI, values smaller than 0.95 will be taken as an indication of poor model fit, values between 0.95 and 0.97 are taken as an indication of acceptable model fit, and values larger than 0.97 are taken as indication of good model fit.

The results are in Table 4. As can be seen, according to all fit indices, the fit of the Empirical Model is good. As the Empirical Model has already been modified by adding the cross-loadings, and as the model fit is already good, the Empirical Model is not modified any further. The Theoretical Model fits acceptable according to the RMSEA and good according to the CFI and TLI. Modification indices indicated four residual covariances to be a source of misfit. These residual covariances are added to the Theoretical Model. As can be seen from Table 4, the resulting modified Theoretical Model fits similarly well to the data as the Empirical Model, but with fewer parameters.

Therefore, the conclusion is that the factor structure of the 1985 study by the Dutch Foundation for Statistics can be replicated but that the model contains many unnecessary modifications. The model without modifications but with four additional residual covariances performs equally well to the model by the Dutch Foundation for Statistics, while the latter contains many more modifications.

Table 4*Traditional confirmatory factor analysis: Model fit results.*

Model	Scaled χ^2	df	npar	RMSEA	CFI	TLI
Empirical Model	3006.529	230	142	0.047	0.997	0.996
Theoretical Model	4085.909	246	126	0.057	0.995	0.995
+ free $r_{17,23}$	3634.547	245	127	0.053	0.996	0.995
+ free $r_{18,24}$	3297.622	244	128	0.050	0.996	0.996
+ free $r_{1,7}$	3010.528	243	129	0.047	0.997	0.996
+ free $r_{3,6}$	2823.794	242	130	0.045	0.997	0.997

Note. ‘npar’: number of parameters. $r_{x,y}$ denotes the residual covariance between item x and item y

2. Network Analysis

Authors: Jill de Ron & Denny Borsboom

Figure 5 shows the visualization of the unconstrained Gaussian Graphical Model (GGM) containing the 24 items of the paranormal beliefs scale (estimated via the R-package `bootnet` with Spearman correlations; Christensen and Golino, 2019). As is typical for psychological networks, we found a dense network in which all nodes are connected to at least one other node, and with mostly positive edge weights. We used bootstrapped techniques from the `bootnet` package to assess the stability of the edge weights, which seem relatively stable (see Supplementary materials; Epskamp et al., 2015).

To gain insight into the cluster structure of the network, we performed a nonparametric bootstrapped exploratory graph analysis with glasso estimation (bootEGA with 10,000 iterations; Christensen and Golino, 2019). The bootEGA findings do not support the four-factor structure identified in the 1985 study. Instead, the most frequent number of clusters was five, which was observed in 5,969 out of the 10,000 iterations. As the variables in the dataset are highly skewed, we also performed bootEGA with TMFG estimation procedure, which resulted in three clusters (see supplementary materials, Table 2). That different estimation procedures lead to different results indicates that the number of clusters is unclear.

The items featured consistent assignment to clusters, with a high proportion ($>.80$) being assigned to the same cluster across iterations (see Supplementary Table 1). Both cluster 1 (‘extraordinary human abilities’) and cluster 4 (‘everyday superstition’) are similar to the factor structure found in the original 1985 study. However, the current analysis suggests that ‘predictive dreams’ should be assigned to cluster 1, which seems sensible as it represents an extraordinary human ability.

Within some of these clusters, there are clear evidential relations between the beliefs,

EGA clusters with glasso estimation

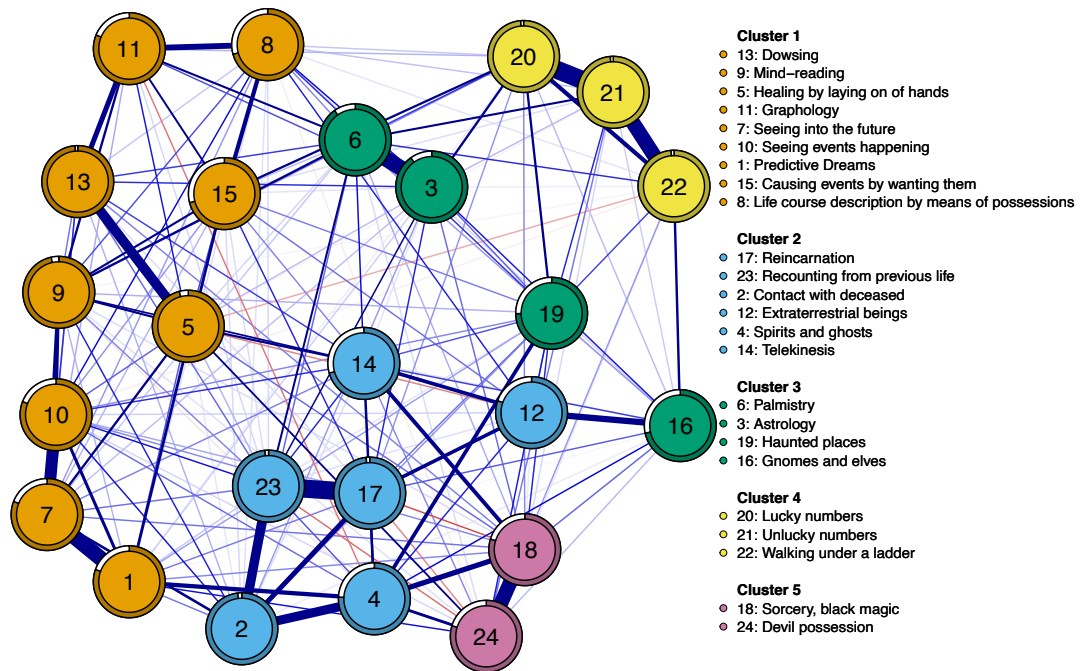


Figure 5

The network containing the 24 items of the paranormal beliefs scale. Blue edges represent positives partial correlations and red edges represent negative correlations; the greater saturation of the edge indicates a stronger partial correlation. The clusters were identified via a bootstrapped Exploratory Graph Analysis with glasso estimation method. The pie chart around each node indicates the proportion that an item was placed in the same cluster out of 10,000 iterations of the bootEGA function. Most of the items had a high proportion (>.80) to be in the similar cluster across iterations.

with one being a necessary or sufficient condition for the other. One example is the strong partial correlation ($r = .23$) between the belief in ‘spirits and ghosts’ (item 4) and the belief in ‘contact with the deceased’ (item 2) – believing in the possibility of engaging in communication with the deceased necessitates the belief in ghosts and spirits, while the belief that one can communicate with the deceased is a sufficient condition for believing in ghosts and spirits. Another example is the strong connection between the three items ‘seeing into the future’ (item 7), ‘predictive dreams’ (item 1), and ‘seeing events happening’ (item 10), as believing in predictive dreams or direct perception of future events necessitates a belief in the ability to see into the future, while the latter is sufficient for the former. To the extent that the relevant associations are due to direct evidential relations rather than to the common influence of a latent variable, this suggests that a network representation

may be preferable to a latent variable model for the relevant items.

3. *Bayesian Network Analysis*

Authors: Nikola Sekulovski & Maarten Marsman

The Bayesian analysis of the network structure (Huth et al., 2023; Marsman & Haslbeck, 2023), taking into account the factor structure obtained in the 1985 study, reveals insufficient evidence to support the original four-factor structure solution. We compare the cluster-level Bayes factors (BF_{10}) for the hypothesis \mathcal{H}_1 , which states that there is a direct connection between all pairs of items within a cluster, against a null hypothesis \mathcal{H}_0 , which states that there is not a direct connection between all pairs of items within a cluster. Based on the results, only the BF_{10} for the fourth factor, ‘Everyday superstition’, which includes items 20, 21 and 22, shows support for \mathcal{H}_1 . Conversely, the BF_{10} for the remaining three factors provide strong evidence against \mathcal{H}_1 . It is worth noting that we used a cutoff of $BF_{10} > 10$ (or $< 1/10$; Huth et al., 2023); nevertheless, all four Bayes factors exceeded this threshold by a considerable margin. Our results are shown visually in Figure 6. For the details of this analysis, we refer the reader to the supplementary material.

4. *Latent Class Analysis*

Authors: Šimon Kucharský & Ingmar Visser

In principle, Latent Class Analysis (LCA) cannot directly address the factor structure of the items; LCA searches for clusters of respondents that have something in common, whereas factors are clusters of items that have something in common. As such, LCA is not suitable to provide evidence for a factor structure of a questionnaire, as it answers a completely orthogonal question to that (cf. Oberski, 2016). That said, we found some evidence that informing the LCA model (custom-coded in the probabilistic programming language Stan; Carpenter et al., 2017) with constraints that allow grouping the items into clusters based on the original CFA factors improves the fit of the model and finds additional groups of participants in the data; most prominently, a group of participants that are relatively skeptical towards everyday superstitions but less skeptical towards other types of paranormal phenomena. As such it is plausible that a 4 factor model would fit the data, even though it is likely that the factors would be highly correlated, raising the question of whether it is practical to distinguish between the four factors in the first place. In fact, the interest in these data may lie more in the possibility to distinguish groups of people with various levels of skepticism, than in determining the commonalities between items.

The best-fitting model is informed by the four-factor structure found in 1985 and allows the agreement with each item to vary across items. This suggests the following:

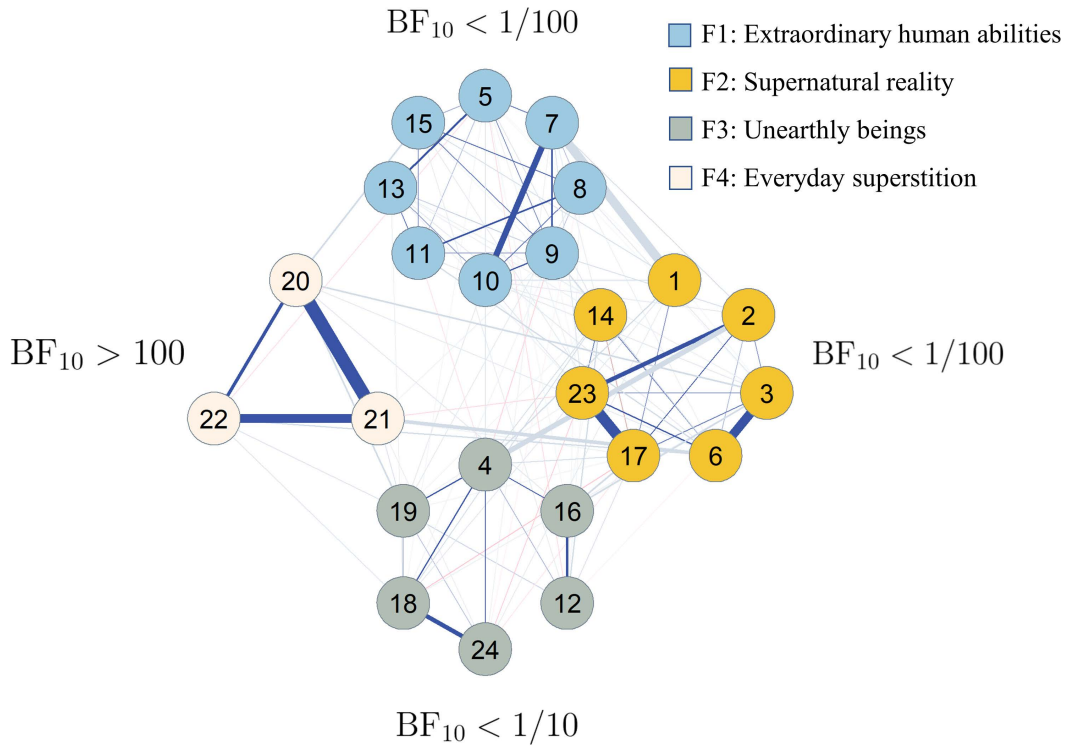


Figure 6

The estimated network structure represents the median probability model, which includes all edges with at least 0.5 probability of inclusion. The nodes are grouped based on the 1985 factor structure. Positive relations between items are depicted by blue edges, while negative relations are represented by red edges. Thicker edges indicate stronger relations. It is important to note that edges between clusters (i.e., factors) are intentionally less pronounced to place a stronger emphasis on the factor structure. Each cluster is accompanied by the BF_{10} , which indicates the level of support for \mathcal{H}_1 against \mathcal{H}_0 .

1. There is a substantial variability in agreement between items which is not captured properly if we constrain η across items.
2. Allowing the model to classify participants into 16 groups (all combinations of the four factors) instead of 2, while only allowing ‘low’/‘high’ responses on each item substantially improves fit to the data; this suggests that there are subgroups that score high on items associated with one factor but low on items associated with other factor(s).

In particular, the LCA indicates that about half (47%, 95%CI [45%, 49%]) of the population are extremely skeptical towards any kind of paranormal phenomena, uniformly across all item types. About a quarter of the population (25%, 95%CI [23%, 28%]) are

Table 5

Latent class analysis: Proportions of the 16 classes estimated by the model.

Class	Proportion	95% CI		Count
		Lower	Upper	
“Skeptics”	0.47	0.45	0.49	1302
“Believers”	0.26	0.23	0.28	668
EHA + SR + UB	0.10	0.08	0.11	212
EHA + SR	0.04	0.03	0.05	145
UB	0.02	0.02	0.03	41
EHA	0.02	0.01	0.03	66
ES	0.02	0.01	0.03	54
EHA + ES	0.01	0.01	0.02	27
EHA + UB	0.01	0.01	0.02	25
SR + UB + ES	0.01	0.00	0.02	5
EHA + SR + ES	0.01	0.00	0.02	21
SR + UB	0.01	0.00	0.01	11
SR	0.01	0.00	0.01	15
SR + ES	0.00	0.00	0.01	9
ES + UB	0.00	0.00	0.01	7
EHA + UB + ES	0.00	0.00	0.03	0

Note. EHA - Belief in extraordinary human abilities; SR - Belief in supernatural reality; UB - Belief in unearthly beings; ES - Belief in everyday superstition.

less skeptical towards any and all paranormal phenomena. About a tenth of the population (10%, 95%CI [8%, 11%]) are extremely skeptical towards everyday superstitions, but less skeptical towards other types of paranormal phenomena. The proportions for each of the 16 estimated classes are shown in Table 5. Note that in the Table the second class is called “believers” although the average score in this group was still below the midpoint of the scale, between ‘probably not’ and ‘maybe’ – the term ‘open-minded-skeptics’ may be more appropriate than ‘believers’.

Discussion

The finding of 38 years ago that 40 percent of the Dutch population believe in dowsing and healing by laying on of hands was met with some surprise at the time. In our current replication of the survey, we found that most percentages have dropped considerably, in some cases by half or more: where in 1985 40% of respondents indicated that they believed in graphology, dowsing, and healing by laying on of hands, this is now less than 20

percent. At the same time, using the criterion that one qualifies as a paranormal believer if one endorses at least one phenomenon with some certainty, more than half of the Dutch population (55.6%) could be considered a paranormal believer in 2023. We note that for two items, one could argue that they can be interpreted in a non-paranormal manner: (a) graphology – someone’s handwriting might give a clue about personality characteristics such as conscientiousness, and (b) life course description by means of possessions – someone who owns a lot of soccer-related items is probably a soccer fan and someone who owns a lot of toys is probably a child or is raising one. Nevertheless, after removing these two ambiguous items from the survey, the rate of believers remains relatively high at 52.5%.

In comparison to the 1985 data, it is notable that belief in phenomena surrounding the survival of the soul after death has remained stable: contact with the deceased, reincarnation and knowledge of a past life remain probable for 12-15% of Dutch citizens. In general, we see that belief in ‘positive supernatural forces’, such as prophetic dreams, is stronger than in negative forces, such as the existence of cursed places. Remarkably, belief in unearthly beings seems to have increased the most over the last 40 years: belief in contact with aliens, ghosts and spirits, and gnomes and elves has roughly doubled from 1985.⁸ Yet again, these rates are still considerably lower than those reported in the US; both in terms of the endorsement rate for specific paranormal phenomena and the overall rate of paranormal beliefs based on believing in at least one phenomenon the Dutch are considerably more skeptical than the Americans, as well as the British and the Canadians (Chapman University Survey, 2018; Ipsos, 2023; Lyons, 2005; McGlone, 2017; Moore, 2005). For example, the existence of ghosts is believed by 39% of Americans versus only 13% of the Dutch. Based on endorsement of 10 items, 75% of Americans qualify as paranormal believers, whereas this was 56% of the Dutch based on almost 3 times as many items.

Media reports on the rising popularity of paranormal and spiritual beliefs notwithstanding, our results are not particularly surprising in the context of the general perception of the Dutch as down-to-earth, skeptical people. Moreover, several recent studies investigating the prevalence of supernatural beliefs in the Netherlands paint a similar picture (de Hart, 2014; Gervais et al., 2018). For instance, in a recent large-scale cross-cultural study, we found that the Netherlands was among the countries with the lowest reported levels of religiosity and that the Dutch were the most skeptical about the possibility of mental and physical states continuing after death (i.e., in the afterlife; Hoogeveen, Altay, et al., 2023; Hoogeveen et al., 2022). Another study using a representative sample indicated that of those not believing in God, the majority of the Dutch were classified as analytic atheists, rejecting any type of supernatural reality or entities (Lindeman et al., 2019). Finally, a

⁸Although we note that a change from 1% to 1.8% for belief in gnomes and elves should not receive too much weight.

recent study highlighted that in many (secular) countries, including the Netherlands, science constitutes the most important worldview among non-believers, suggesting a role for (scientific) education in the process of secularisation (Van Mulukom et al., 2023).

In terms of the predictors of paranormal beliefs, we obtained strong evidence that gender, spiritual and religious identification, exposure to parental displays of paranormal affinity, and conspiracy beliefs are related to paranormal beliefs; paranormal believers are more likely to be women, to consider themselves spiritual but not religious (or religious and spiritual), to have observed their parents engage in paranormal activities, and to hold general conspiracy beliefs. Contrary to 1985, however, we found no evidence that young people are more drawn to the paranormal – on the contrary, age was positively, though weakly, related to paranormal beliefs. Notably, the 1985 youth group – today’s 56-62 year olds – is still the group with the strongest paranormal belief. This might suggest a cohort effect in 1985 – as suggested in the 1985 report by the Dutch Foundation for Statistics and elsewhere (de Hart, 2013). Our data do not speak to what is driving this relatively high rate of paranormal belief among Generation X, but socio-historical and economic factors including secularisation and economic uncertainty might have played a role.

Based on the current findings and media reports, we could speculate that the tendency to appeal to a ‘different’ reality still remains prevalent, yet its main shape has changed. Instead of relying on the extraordinary abilities of some paranormally-gifted individuals (e.g., palm readers, clairvoyants, mental healers), the modern focus seems to be on everyone’s own individual mental powers, such as manifesting one’s dreams and wellness-related pseudo-scientific claims to boost one’s health, but also conspiracy beliefs about secret organisations and pharmaceutical cover-ups. The current data also demonstrated that conspiracy beliefs are far more prevalent than paranormal beliefs (i.e., a mean score of 2.72 vs. 1.83 on the 5-point Likert scale), with 54% of the Dutch believing that “Important things remain undisclosed to the public”. We note, however, that the scales are not comparable in nature, as the items on paranormal beliefs ask about specific, concrete phenomena (e.g., reincarnation, telepathy), whereas the conspiracy items target more general openness to the possibility of conspiracies (i.e., some politicians may have hidden motives).

This difference between scales also relates to an important limitation of the current study: our paranormal beliefs scale included very specific phenomena. While this setup has the benefit of being concrete and straightforward to interpret for respondents, it also risks the possibility of missing relevant phenomena and being too culture- and time-specific. For instance, the act of dowsing and earth radiation to locate hidden water sources was relatively popular in 1985, but it was likely less familiar to the younger generations in our sample (see Figure 2). In addition, the current findings are not directly generalizable beyond the Dutch population; both the included phenomena and measured belief rates are specific to the

Dutch context. This limitation on generalizability mainly affects the prevalence rates and potentially the findings regarding the structure of paranormal beliefs and identification of different groups of believers/skeptics. We believe the findings regarding the predictors and correlates of paranormal beliefs are more universal and have also been found in different countries (e.g., Darwin et al., 2011; Lindeman et al., 2015; Lindeman & Aarnio, 2006; Lobato et al., 2014; van Elk, 2015; Vyse, 2014; Willard & Norenzayan, 2017).

In addition to assessing the prevalence and correlates of paranormal beliefs, we also investigated the (factor) structure of paranormal beliefs. We invited four teams with different methodological expertise to examine to what extent the factor analytic results reported in a survey from 1985 using the same items could be replicated on the current data. The teams applied traditional confirmatory factor analysis, network analysis, Bayesian network analysis, and latent class analysis to address this question. The results revealed some support for the 1985 finding of four underlying factors of paranormal belief: extraordinary human abilities, supernatural reality, unearthly beings, and everyday superstition. In particular, the model based on the 1985 report showed adequate fit according to the traditional confirmatory factor analysis, and informing the latent class analysis by the 1985 factor structure did improve the model fit. At the same time, the four analytic techniques also indicated notable differences in the conclusions they come to based on the same underlying data. For instance, the frequentist network analyses suggested a preference for a five cluster structure over the original four cluster structure. Moreover, for three of the four original clusters, the assumption of all items within a cluster being strongly connected did not hold according to the Bayesian network analysis. Finally, the latent class analysis identified different groups of people regarding their paranormal affinity, with almost half of respondents qualified as general skeptics, followed by overall believers (though not necessarily strong believers, but rather open-minded skeptics) and those that reject superstition but are somewhat open to other paranormal beliefs.

These results paint a nuanced picture of paranormal beliefs among the Dutch population. Overall, the estimated network based on the frequentist analysis was quite dense, with almost exclusively positive relations between items, suggesting that the phenomena indeed share some general features. Yet the Bayesian network analysis revealed strong evidence against a direct connection between items within the clusters ‘extraordinary human abilities’, ‘supernatural reality’, and ‘unearthly beings’. That is, while some clusters of items could be identified and improved the model fit, the four factor solution found in 1985 did not seem robust across all four analytic traditions. This interconnectedness of all items without clear sub-clusters also fits the descriptive pattern as well as the theoretical assumption of paranormal beliefs as an idiosyncratic, polymorphic system of supernatural beliefs; instead of prescribed religious doctrines, one can adhere to an individual, customized package of

supernatural phenomena, with elements ranging from clairvoyance to witchcraft and contact with aliens to reincarnation. The descriptive pattern of the data similarly fits these ideas as we found belief rates of 10-20% for most items, with different people endorsing a selection of different items, instead of 10-20% of people endorsing the majority of items.

At the same time, some items display clear evidential relations, such as belief in spirits and ghosts being a necessary condition for believing in contact with deceased, and the possibility of reincarnation being a necessary condition believing in the ability to recount from a previous life. The presence of these direct evidential relations might render a network representation of paranormal beliefs more suitable than a latent variable model in terms of understanding the structure of paranormal beliefs. The main exception to the generality of the paranormal phenomena network may be the items on superstition (lucky/unlucky numbers and misfortune from walking under a ladder); these three items were consistently identified as a separate cluster, and also constituted the demarcation of two groups of people in the latent class analysis: those who are slightly open to all paranormal phenomena (26%) and those who are open to most phenomena but highly skeptical towards everyday superstition (10%).

In general, we believe this study highlighted the value of the several-analysts approach in which specific methodological experts are invited to answer a given question; this setup allows for unique insights that would not have been captured when consulting only one team with a specific background. At the same time, by asking a limited number of specific experts, the logistics and organisation of the project remain manageable (for comparison: see Hoogeveen, Sarafoglou, van Elk, and Wagenmakers, 2023 in which we discuss some challenges of a full multi-analyst project). Approaching a given research question with different methodologies provides a concrete demonstration of the robustness, nuance, and unique angles of the results at hand. While this approach introduces more uncertainty in the outcomes and conclusions, it also generates a more complete and truthful picture of the data and by extension of reality (Aczel et al., 2021; Silberzahn & Uhlmann, 2015; Wagenmakers et al., 2022, 2023).

A practical limitation of the several-analysts approach is that it requires the lead team to be aware of suitable methodological approaches and the associated experts; instead of letting the results show the variety of analytic approaches, one should estimate which approaches are relevant in advance. Moreover, some research questions might be more appropriate than others for inviting different methodological experts; a research question and design that clearly dictates a *t*-test might leave little room for different analytic strategies. At the same time, our experience with a previous multi-analyst project emphasized that the employment of different methodological or statistical approaches should not be understated; we expected mostly multilevel regression models in the Many-Analysts Religion

Projects, yet were surprised to witness the variety of analyses, including machine learning, structural equation modeling, *t*-test, multiverse analysis, and network analysis (Hoogeveen, Sarafoglou, Aczel, et al., 2023; Hoogeveen, Sarafoglou, van Elk, & Wagenmakers, 2023). Furthermore, we believe the several-analysts design could also be extended to involve different *theoretical* experts, instead of solely methodological specialists, somewhat similar to an adversarial collaboration.

In conclusion, the overall level of paranormal beliefs in a representative sample in the Netherlands appears low; none of the inquired phenomena received support from more than 1 in 5 Dutch people. At the same time, more than half of the population endorses at least one paranormal phenomenon with some certainty. In addition, our several-analysts results indicated that a previously identified four-cluster structure of paranormal beliefs with ‘extraordinary human abilities’, ‘supernatural reality’, ‘unearthly beings’ and ‘everyday superstition’ may provide adequate fit for the current data, yet may not unequivocally reflect the optimal structure to classify paranormal beliefs and believers. In general, we would advocate for this several-analysts approach as a practical alternative to full-blown multi-analyst projects that still enables one to empirically capture analytic robustness and uncertainty. By directly inviting a variety of experts, the approach strikes a balance between informativeness and effort and may thus be realistically applicable across many empirical studies. As our demonstration emphasizes, the several-analysts approach can offer different conclusions and take-home messages based on the same data, exposing both contradictions between techniques, but also highlighting complementary insights.

Author Contributions

Contributorship was documented with CRediT taxonomy using tenzing Holcombe et al., 2020.

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Conflicts of Interest

The authors declare that there were no conflicts of interest with respect to the authorship or the publication of this article.

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Appendix**Paranormal Beliefs in 1985 and 2023**

The following table provides the rates of paranormal beliefs in the Netherlands reported in 1985 and 2023. Note that percentages were rounded to integers in 1985 whereas we included one decimal in the 2023 data. Four items were added in the current survey and hence do not have rates in 1985.

Table A1*Belief in paranormal phenomena in 1985 and 2023.*

Item	Year	
	1985	2023
Graphology (characterization by handwriting)	42%	14.8%
Predictive dreams	22%	16.3%
Clairvoyance (seeing into the future)	31%	17.3%
Healing by laying on of hands	41%	17.5%
Dowsing (locating ground water using a rod)	41%	15.9%
Causing events by wanting ('manifestation')	23%	15.6%
Soul/spirit leaving and reentering the body	–	17.0%
Seeing events happening (while absent)	34%	16.4%
Contact with deceased	15%	15.9%
Angels performing good deeds on earth	–	16.6%
Spirits and ghosts	7%	16.3%
Reincarnation	11%	12.1%
Recounting from a previous life	10%	13.3%
Life course description by possessions	20%	9.5%
Telepathy (mind-reading)	32%	9.8%
Contact extraterrestrial beings (aliens)	4%	8.5%
Haunted places	8%	6.7%
Sorcery, black magic	12%	11.2%
Astrology	13%	7.0%
Contact supernatural beings via ouija board	–	9.9%
Palmistry (palm reading)	11%	5.7%
Protecting property with objects and charms	–	9.6%
Telekinesis (moving objects with mental force)	15%	6.7%
Devil possession	10%	8.1%
Lucky numbers	9%	4.4%
Unlucky numbers	6%	2.6%
Misfortune from walking under a ladder	4%	1.8%
Gnomes and elves	1%	1.7%

Note. Percentages reflect the percentage of people answering 'definitely' (5) or 'probably' (4) on each item. Items are ordered according to the average belief score in 2023. Percentages are based on representative samples of $N = 2610$ respondents in 2023 and 813 respondents in 1985.